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A revised perspective on innovation policy for renewal of mature economies – Historical evidence from finance and telecommunications in Sweden 1980–1990[☆]



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ABSTRACT

What is the role of innovation policy for accomplishing renewal of mature industries in Western economies? Drawing upon an unusually rich dataset spanning 9752 digitized archival documents, we categorize and code decisions taken by policymakers on several levels while also mapping and quantifying the strategic activities of both entrant firms and incumbent monopolists over a decade. Our data concerns two empirical cases from Sweden during the time period 1980–1990: the financial sector and the telecommunications sector. In both industries, a combination of technological and institutional upheaval came into motion during this time period which in turn fueled the revitalization of the Swedish economy in the subsequent decades. Our findings show that Swedish policymakers in both cases consistently acted in order to promote the emergence of more competition and de novo entrant firms at the expense of established monopolies. The paper quantifies and documents this process while also highlighting several enabling conditions. In conclusion, the results indicate that successful innovation policy in mature economies is largely a matter of strategically dealing with resourceful vested interest groups, alignment of expectations, and removing resistance to industrial renewal.

1. Introduction

During the last couple of decades, we have seen an increased awareness of the role of innovation not only for economic development per se, but also for dealing with challenges that come with globalization, digitalization, social polarization and environmental changes. Innovation enables both firms and economies to transcend established trade-offs, e.g. between cost and value on the firm level and between e.g. economic growth and sustainability on the societal level.

As a consequence, the topic of innovation policy is of strategic importance for both developed and emerging countries in order to remain competitive and sustainable. Here, innovation policy can be defined as actions taken by government bodies with the purpose of generating more innovation in society (Edler and Fagerberg, 2017).

While developing economies phase a range of challenges such as resource attraction, technology development, pollution, access to

skilled labour and crafting of institutions that enable innovation to take place, developed economies have their own set of challenges, including low-cost competition from other countries, technological lock-in, environmental and social consequences of industrial progress, various forms of systems failures, and renewal initiatives being blocked by vested interest groups (Mokyr, 1994). Innovation and renewal of mature industries is therefore a non-trivial matter in Western economies. At the same time, advanced economies are pressed by changes in demography, increased mobility on the labour market and the rise of countries like China and India as both low-cost competitors and technological powerhouses of their own.

While the role of policy for innovation and renewal in developed economies has been a hot topic among scholars for many decades (Lerner, 2009; Mazzucato, 2013), there are presently few detailed empirical descriptions of successful contemporary industrial renewal. Specifically, there are few field-level, historical accounts of how entire

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industries have adopted a novel technological and institutional regime which explicitly document and disentangle the interplay between firm strategies and policy initiatives over a longer time period.

The purpose of this paper is to explore the role of policy in accomplishing path-breaking renewal in established Western industries, while also highlighting enabling and constraining conditions. Our overall research problem concerns how Technological Transitions (TTs) can be accomplished, and in particular, what is the role of policy in generating such transitions. Our research question can therefore be formulated as follows: *how can policy contribute to Technological Transitions?* We are also interested in why policymakers may act in order to favor non-incumbent interest groups rather than being captivated by the status quo (c.f. Karlsson, 2017). Economic theory usually tells a story of policy being appropriated by actors with superior financial and relational resources, thereby blocking renewal (Rotmans et al., 2001).

Drawing upon an unusually rich archival data-set spanning firms and policymakers in two industries over a decade, we code and quantify policies and strategies in order to explain how a new socio-technical regime is accomplished.

Our two case industries come from the Swedish economy, which is usually ranked as one of the top ten countries worldwide on the Global Competitiveness Index by the World Economic Forum. In addition to the benefits of being an open economy with strengths in export-oriented goods, Sweden is among the world's leading countries in some high-technology industries such as Information and Communication Technologies (ICTs) and knowledge-intensive services (European Commission, 2015). Sweden experienced a remarkable process of renewal during the 1980s and 1990s in the financial exchanges industry and in telecommunications. The world's first fully electronic stock exchange was launched in Sweden in 1989 and the exchange was the first in the world to be privatized in 1992. In the telecommunications sector, Sweden and the Nordic countries paved the way for full scale mobile telephony with the advent and diffusion of mobile telephony in the 1980s with the NMTsystem (Nordic Mobile Telephony) and subsequently with GSM. Today, Stockholm, the capital of Sweden, is hosting the highest density of unicorns after Silicon Valley, mostly within Information Technology. The events in the 1980s in the financial industry and in telecommunications have in many ways paved the way for subsequent revitalization of the Swedish economy. Mapping and disentangling these events and the role of policy is therefore of considerable interest to both policymakers and academics.

We begin this article with a condensed literature review on Technological Transitions (TTs) and systemic innovation policy, while also situating our paper in more detail in relation to current research. Next, our data sources and our methodological approach is described in more detail. This is followed by case descriptions from the financial sector and the telecommunications sector. Eventually, an analysis is provided along with a discussion and some concluding remarks.

2. Previous research on innovation policy and industrial renewal

Technological Transitions (TTs) can be defined as substantial alterations in the way a certain societal function is handled. As such, TTs do not only concern changes in technology, but also changes in regulation, division of labor, practices and possibly in value creation and distribution (Geels, 2004). Grin et al. (2011) refer to TTs as fundamental changes in the deep structure of the incumbent regime. TTs, thus, ultimately concern the interplay between technological, economic, regulatory and other institutional factors where a certain technology's value comes from its deployment in an embedded socio-economic setting. As technology is intertwined with practices and routines, in power structures, separations of work and in institutional arrangements, TTs are usually difficult to generate through isolated deliberate action. Rather, TTs arise through new combinations of alternative behavior, by aggregates of actors, not always coordinated. Furthermore,

since new technology is frequently incompatible with existing socio-institutional frameworks (Freeman and Perez, 1988a, 1988b), TTs call for a combined change of both technology and institutions.

Drawing on contributions in Evolutionary Economics (Nelson and Winter, 1982) and Technology Studies (e.g. Latour, 1991), Geels (2004) developed a multi-level framework for assessing TTs. This framework consists of several interrelated layers. The layer directly related to the technology and its usage is referred to as the *Socio-technical regime* (ST). The ST is a collection of actors and institutions such as firms, meanings, customers and regulations directly governing the adoption and development of technology. At this level, technologies still evolve, but they usually do so in an incremental manner. This is because the actors of the regime hold their current position as a result of the current technological paradigm, and any threat to that is thus also a threat to their current position in the societal and industrial hierarchy. Thus, although the actors of the regime may hold capacity to initiate and implement wider changes, they usually lack incentives to do so (Battilana, 2006; Rotmans et al., 2001).

According to Geels (2004), radically new technologies are instead generated in *niches*, i.e. sheltered domains of the ST where substantially different and still immature technologies may develop and grow, protected from the structuration forces of the regime during the maturation process (Kemp et al., 1998). If successful in the maturation process, new technologies developed through selection processes of niche experiments may challenge and ultimately replace the old technologies of the regime. The ST can thus be regarded as a meso-level where stability exists, whereas the niche is a micro-environment where a new technology can be nurtured without distorting an established ST.

The *Landscape level* concerns the overall macroeconomic constellations of society which go beyond the ST and can be regarded as external factors, or the broader context in which regulation is defined and action takes place. The Landscape thus includes the overall material wealth of a society, unrelated socio-technical arrangements and broader trends. On this level, changes usually happen slowly in the form of cultural, demographic and broader political changes. Moreover, these changes are usually beyond any actor's direct control, at least within the ST.

These three levels – niches, socio-technical regimes and the landscape, are nested, i.e. niches are embedded in regimes and regimes are embedded in landscapes. In highlighting the role of different levels and their nested nature, the multi-level framework emphasizes several enabling factors for TTs to come about. First, niches are very important as they present an opportunity for technology to evolve in a context where it is undisturbed. Second, TTs can only take place if the appropriate conditions are aligned on all three levels (Kemp et al., 1998). Niches, while important, are not by themselves sufficient prerequisites for TTs to come about. On the contrary, most innovations remain on the niche level and never make it into a full TT, usually because the ST and the landscape are not aligned with it.

2.1. Barriers to Technological Transitions (TTs)

As stated by Geels (2004), a novel technology is usually blocked from widespread diffusion when it enters the ST. Here, a collection of barriers exists. Broadly speaking, forces of path dependency within the ST often result in technological lock-in and resistance to change (Dosi, 1982).

Previous research has identified a collection of forces that jointly result in such lock-in. First, actors of the ST may not be able to coordinate themselves sufficiently to adapt a novel technology. A collective action problem may prevail where no one single actor is able to reap sufficient benefits to bear the burden of enacting a change (Glasmeier, 1991), sometimes also referred to as market failure (Arrow, 1962). This pattern has been described as a system failure within current literature. Examples include lack of capabilities, lack of incentives and interdependencies resulting in lock-in.

New technologies may also meet considerable resistance from

vested interest groups who benefit from the status quo. TTs therefore often require that some actor groups are decimated or removed completely. Such actors will have asymmetrically strong incentives to block those agents who try to generate a TT. At the same time, actors with strong incentives to challenge established regimes may not have the capacity to do so. According to Battilana (2006) successful change agents – sometimes referred to as institutional entrepreneurs – are most likely found in the mid-level of societal and industrial hierarchies; they hold a certain degree of dissatisfaction with the current regime standards, which gives them strong enough incentives to initiate change; they also hold a certain degree of power and influence in the community, which give them capacity to realize their ambitions.

Third, a novel technology may not be compatible with the existing institutional regime. Both formal and information institutions may need to be altered in order to be compatible with a new technology. Such processes may be blocked by vested interest groups who are able to capture the regulatory process to their favor (Acemoglu and Robinson, 2006) due to superior financial and relational resources.

2.2. Innovation policy and TTs

A range of different policy implications can be derived from Geels' (2004) multi-level framework for TTs. Previous research has highlighted that policy can play a role in actively creating niches, i.e. nursing markets where technology can be incubated and further developed (Jacobsson and Bergek, 2004). Second, systems failure may require policy in order to coordinate dispersed actors. Third, government investments in R&D and development of new technologies may be motivated in the early stages, as little financial gains can be reaped due to insufficient microeconomic incentives (Arrow, 1962).

By and large, innovation policy in the Western world has been built around the notion that governments can support innovation and thereby stimulate economic growth, as innovation ultimately leads to economic growth (Mazzucato, 2013). Innovation policy has been broadly concerned with creating the support required to overcome market or systems failure (Laranja et al., 2008), recently described by Schot and Steinmueller (2016) as innovation policy 1.0. and 2.0. According to these scholars, innovation policy 1.0 has been mainly directed to R&D-based innovation, drawing on a linear model in which scientific progress ultimately lead to advancement of technology. Innovation policy 2.0, on the other hand, is underpinned by the systems of innovation perspective and acknowledges a significantly broader knowledge base for innovation and, as a consequence, seeks to strengthen the link between discovery and application of knowledge in a non-linear manner (c.f. Kline and Rosenberg, 1990). An alternative approach that has gained increased interest in the recent decade is referred to by Schot and Steinmueller (2016) as innovation policy 3.0. This alternative approach explicitly targets societal needs and the so called grand societal challenges. Due to the inherent complexity of these societal challenges, innovation policy 3.0 targets the achievement of system wide transformations in which technology is merely one dimension among many. What is ultimately targeted is the behavior of actors and whole societies (Kivimaa and Kern, 2016).

One crucial element of innovation policy 3.0, targeting system wide transformation, is the directionality of aggregates of actors (Weber and Rohrer, 2012), highlighting the need for moving beyond a focus on generating innovations in as effective mode as possible, but also contributing to a particular direction of transformative change. Such directionality is also dependent on coordination among actors of the societal system, partly in terms of demand articulation and legitimacy of new technologies, but also in terms of coordination of policy measures targeting different sectors and societal levels (Grillitsch et al., 2019).

One concrete illustration of such an alternative approach to innovation policy is provided by Potts et al. (2016) who states that there are usually both winners and losers in TTs, and thus innovations usually have both “friends” and “enemies”. Enemies are those actors who may

lose from the introduction of an innovation. It could be a firm that is rendered obsolete or a collection of workers performing a particular function that is to be removed by new technology (Juma, 2016). To these actors, it is rational to devote time and effort towards blocking an innovation from being diffused. Low degree of directionality and lack of shared demand articulation on the system level would thus allow such friends and enemies to nurture their position in such a landscape of vested interests, while increased directionality and shared demand articulation would move the TT as a whole forward at a higher pace. It is thus in the interest of innovation policy 3.0 to bridge such vested interests, which in turn require quite some degree of policy coordination and learning (Grillitsch et al., 2019). Such coordination and learning would require adaptation both on the level of actors, networks and institutions, allowing for a novel policy rationale.

With this distinction between friends and enemies with vested interest, and the policy system's ultimate strive for directionality on a system level in mind, innovation policy can be analyzed by drawing upon public interest theories which consider policy to be the outcome of interest group competition, where businesses work jointly to secure its own interests against other actors in society (). In a similar fashion, economists regard policy as captivated by industry who receive benefits from politicians in exchange for control over entry, prices and direct subsidies in exchange for votes and contributions (Shaffer, 1995). Public choice theory takes the core assumptions of economics in terms of scarce resources and rational self-maximizing behavior into the realm of politics (Buchanan, 1980). Under these assumptions, policy-making is regarded as a marketplace where interest groups, voters, politicians and bureaucrats exchange favors. Empirical investigations usually tell a story of vested interest groups engaging in regulatory capture, shaping formal institutions to their benefit due to superior resources and at the expense of entrant firms (Lawrence Carleheden, 1999). As such, public choice theory and related economic literature on competition and regulatory change pay little attention to contingencies or firm characteristics.

2.3. Synthesis and research gap

From the above point of view, innovation policy becomes a matter of overcoming resistance from vested interest groups and of arriving at agreed directionality, demand articulation and coordination. However, the public choice perspective indicates that such policies are costly to enact for policymakers. A support initiative has a private beneficiary in the form of certain actors who e.g. receive R&D grants. The cost for such an initiative is the tax burden incurred upon the general public, which is usually negligible compared to a government budget. Policies devoted to removing resistance will, on the other hand, often lack any private beneficiary, while at the same time imposing considerable harm upon the resisting interest group. Such policies are therefore difficult to enact by vote-maximizing politicians and therefore regulatory capture often takes place.

More empirical research is therefore needed concerning the role of policy in accomplishing a TT. Specifically, we are interested in advancing our understanding of how policy can contribute to avoid regulatory capture and how such policies can be politically justified. As stated above, economic theory often tells a story of vested interest groups blocking change, stimulating “more evolution than revolution” (Rotmans et al., 2001). This paper explores exceptions to this pattern, and seek explanations to these exceptions. Insights from the study thus contribute to advance both the theory and practice of transition and innovation policy.

3. Method and case selection

In order to study industrial renewal in Western economies from a transitions point of view, we draw on data from the telecommunications sector and the financial exchange sectors in Sweden. As processes

of renewal take considerable time, we follow a number of previous studies in using a systematic historical approach suitable to analyze how processes and patterns of renewal during industry transitions unfold over time, take into account the role of context and actors at multiple levels of analyses (e.g. Geels, 2004; Reichardt et al., 2016; Turnheim & Geels, 2013).

The two sectors provide particularly interesting comparative historical cases for understanding of successful policy renewal of regulated sectors in mature economies. Both the telecommunication and financial sectors have been characterized by monopolies that persisted since their inauguration. In both cases new technologies and products – mobile telephony and options – triggered the emergence of new actors on an initially closed market where unique efforts of institutional entrepreneurship and non-market activities leveraged these to slowly dismantle the existing *de jure* and *de facto* monopolies. In both cases these activities started out in an ambiguous regulatory environment where the Stockholm Stock Exchange had a monopoly on *equity trading* that did not include *options trading* and the Swedish Televerket had a monopoly on *fixed line telecommunications* that did not include mobile communications. In a similar manner for both cases, this was not a case of the regulators intentionally separating the market into several niches, but rather a case where regulation was not keeping pace with technological advancements. Finally, in both cases this regulatory ambiguity gave rise to new entrants operating in niche markets separated from the main markets of the incumbents. While, both these ventures were initiated by institutional entrepreneurs acting on unique opportunities, their efforts in changing institutions continued with increasing intensity until the actual removal of the monopolies that ended up merging the previously distinct markets.

The two cases stand out as success stories of combined technological and institutional renewal. In the financial sector, the Stockholm Stock Exchange was the first exchange in the world to offer a fully digital exchange system in 1989 and the first national stock exchange to be privatized in 1992. Relatedly, the entrant firm OptionsMäklarna's (OM's) platform for options trading was allowed to co-exist with the government monopoly in the 1980s, despite creating considerable institutional turbulence. In the telecommunications sector, the Swedish government monopoly and regulator, Televerket, was progressively decimated during the 1980s. On numerous occasions, government decisions were made to favor Comvik, the entrant firm and various policies were enacted to pave the way for a market structure where Televerket would become one out of several players.

The changes described above have paved the way for Sweden becoming home to one of the most vibrant digital start-up scenes in the world. Sweden's high levels of Internet penetration and sophisticated use of digital technology as fueled the growth of such success stories such as Spotify, Klarna and iZettle which places Sweden second only to Silicon Valley in terms of hosting billion-dollar start-ups. The changes we study in the telecommunications and financial sectors in the 1980s are interesting because they created conditions for revitalizing the Swedish economy.

3.1. Data collection: digital archives

We collected archival data from 18 organizational and personal archives: 9 archives covering the Swedish telecommunications sector and 9 archives covering the financial exchange sector (see [appendix 1](#) for archive details and method). The archives were selected to cover two sectors incumbent monopolists, entrants, government department, supervisory bodies, government official investigations and key interest groups (labor union and industry association). (See [Table 1](#).)

The different types of archival documentary sources and for the two sectors is presented in [Tables 2 and 3](#). The data consisting of meeting

minutes and related documents, mail correspondence, regulatory referral answers and opinions and strategic planning document. In addition to primary archival sources, we also collected complementary news articles. For press & media mentions, both Televerket and Stockholm Stock Exchange collected all the mentions in the media for most of the period available in archive folders. For complete coverage of the period, we complemented these with keyword search in a news database covering all 4 major Swedish newspapers (Digidaily).

All the data photographed, OCR processed into PDF-format and text and input with enriched structured metadata in a FileMaker relational database. The database enabled us to search for words and sentences in the full text documents or based on document metadata (date, author, organization etc.). This was done within the scope of a larger research project concerning the interplay between technological and regulatory change. The Stockholm Stock Exchange data (SSE) contains a total of 2608 documents, which have also been photographed, digitalized and OCR-processed.

Using a search function available in the digital database, we have identified actors such as politicians, regulatory bodies and government departments related to both sectors. Decisions, statements and documents have been extracted and coded, making it possible to quantify the different activities of regulators, entrants and incumbent firms. Decisions by policymakers on various levels were coded as either being in favor of the entrant, favoring the incumbent monopolist or being neutral ([Figs. 1 and 2](#)).

With regard to the financial sector, the involved supervision authorities were identified as well as their different activities. All relevant documents where decisions regarding market regulation mentioned entrant/incumbents. Next, coding as in favor or against the incumbent was performed. In the category favoring the monopoly, suggestions and activities aimed to let separate options exchanges be absorbed by the SSE are placed. In those cases where arguments in favor of competition and a private, competing exchange were brought forward, these were coded as favoring competition.

A similar strategy was employed concerning the telecommunications sector. The first category dealt with internal and external activity of Comvik and Televerket, this category includes management minutes, letter correspondence and meeting protocols. These files contain information about both Comvik and Televerket as well as other actors such as politicians in government and parliament, and government agencies that implement, interprets make decisions out of parliament and government guidelines and decisions. The second category is the decisions made by the government and the government agencies, mostly the NO agency, that reflects the outcome of the activity of the first category.

4. Empirical data

During the 1970 and 1980s, a combination of new ideas and new technology gradually affected political and public opinion towards institutional change in Sweden. In Sweden, the social democratic party lost their first election since the 1930s in 1976 to a liberal/conservative coalition. Also, the social democratic party, who returned to government power in 1982, became more market oriented than before ([Malm Lindberg and Ljunggren, 2014](#)).

In both the telecom and financial industries, the current government proposes new regulation that is in turn accepted or rejected by the parliament. To support the proposals, public inquiries into possible routes of regulation are made. In both industries, technological innovation spurred jolts that forced a renegotiation of current regulations leading to several such inquiries during the 1980s and 1990s. The virtue of competition and innovation was emphasized in many parts of society including state investigations, policy referrals. Below, we

Table 1
Types of empirical data.

Source type	Swedish telecom sector		Swedish financial exchange sector	
	Number of documents	Number of words	Number of documents	Number of words
Strategic planning documents	273	2,261,181	106	400,805
Board & management minutes, (including board memorandum)	4731	2,278,352	634	359,652
Correspondence	562	305,274	336	177,231
Administrative organizational documents & financial reporting	334	1,028,465	311	1,018,761
Regulatory documents, referral answers, opinions & hearings	844	3,336,972	399	1,200,086
Press & Media	296	2,284,664	767	1,065,455
Interviews	1		20	191,636
Other	77	102,836	61	51,747

Table 2

List of archival sources related to the telecommunications sector. In total, 7118 documents are available electronically.

Archive
Televerket and Telia archives
Televerket Company archives (Swedish National Archives)
PTS (Swedish National Archives), also contains correspondence with the entrant firms Comvik and Europolitan
Archive of the Department of Communication (Swedish National Archives)
Archives of Director General Tony Hagström (Swedish National Archives)
Archives of Statsanställas förbund (Union archive, ARAB)
Televerket Department of Strategic Planning archive
Liberalisering, regler och marknader, SOU 2005:4 (Committee archive, (Swedish National Archives)
Postoch Teleutredningen 1990:27, prop 1992/93:200
Company and interest organization publications from the National Library of Sweden (KB)

Table 3

List of archival sources related to the Stockholm Stock Exchange. In total, 2634 documents are available electronically.

Archive and repository
The Stenhammar archive donated by OM's founder Olof Stenhammar.
Repository: CfN (Centre for Business history)
Stockholm Stock Exchange archive donated by Ingemar Eliasson.
Repository: National Archive, Marieberg.
Holdings of official documents at the Royal Library.
Repository: Stockholm Stock Exchange
The Royal Bank Inspection records on SSE
Repository: National Archive, Arninge.
SOU 1989:72 "Värdepappersmarknadskommittén" (19 volumes, SE/RA/323989)."
Repository: National Archive Marieberg
Ministry of Finance archive from the development of SOU 1989:73.
Repository: National Archive Arninge
The Swedish Securities Dealers Association (SSDA).
Repository: SSDA
SNS archive of the shadow investigation to SOU 1989:72 commissioned to Merton Miller and Charles Upton. "Strategies for capital market structure and regulation".
Repository: SNS
The Cincinnati Stock Exchange Archive
Repository: The D.R.G

describe how these events unfolded in the financial and telecommunications sectors respectively.

4.1. The stock exchange industry in Sweden

In the financial markets, an overhaul of the stock markets that came into law in 1979 opened up for an entrant options market to complement the legally monopolized stock market. The entrant firm was named OptionsMäklarna (OM), and offered the world's first fully

electronic stock exchange in 1985. This in turn led to an investigation into how this and another emerging options markets should be regulated. By 1989, the end result of this investigation was inconclusive leading to a final investigation recommending a complete overhaul of the financial markets including a liberalization removing the earlier monopoly of marketplaces that was accepted and came into law by the beginning of 1992. (See Table 4.)

4.1.1. Regulation and oversight

While there were already influences in the regulatory process coming from the more liberal US market, the main intervention in the Swedish policy process was an unofficial shadow investigation ordered by SNS which is a think tank that promotes cooperation between society and business. The author of this report was the Chicago economist Merton Miller, who later received the Nobel Prize. His final report made a strong case for a liberalized Swedish financial market where fair competition between different marketplaces and high degree of market self-regulation was the best option. While there is no objective way to assess the impact of this shadow investigation, the final law proposal was largely in line with his recommendations than the official investigation. What also likely influenced this development was the internal change at the department of Finance where a specific department, "financial institutions and markets", was created in 1989. The department that became responsible for developing the law proposal became headed by an economist (Stefan Ingves) and recruited several financial economists, a shift from the previous dominance of personnel with law background. According to the head of the department at the time, these changes with support from politicians was important in bringing in economic expertise and a future oriented policy reform focus for the financial sector (Interview).

The main issue on the financial market being the formal monopoly of the Stockholm Stock that did not include options Exchange (SSE) that was challenged by the emerging options market offered by OM from 1984 and forward. Fig. 1 below contains statements from the supervisory body called the Royal Bank Inspection. The figure starts in 1984 and contains information regarding whether the Royal Bank Inspection and other government bodies made decisions favoring the entrant OM or not. The figure starts in 1984 where the inspection started an evaluation process that ended in a license to operate, first to OM and less than a year later to SOFE, a competing options exchange. The bulk of the pro incumbent statements on the other hand can be traced back to the inspection starting out with the opinion that OM and later SOFE in the end should become part of the Stockholm Stock Exchange, which is a position that they moved away from by the final proposition on the future of the financial markets in 1989. In terms of neutral treatment, the main discussions concerned the financial transaction tax in which the inspection treated both the emerging options exchanges and the incumbent stock exchange in a similar manner. In general, we see that policies were not designed to favor established interest groups.

Table 4
Important events related to the Stockholm Stock Exchange.

Year	Important event
1863	The trading with equities is gathered in the Stockholm Stock Exchange - It becomes a de facto monopoly
1980	A new law making SSE a de jure monopoly
1984	OM - an options market - is founded and granted a temporary license to operate
1986	SOFE - An additional options market is founded and starts to operate
1986	An government inquiry into the options market is launched
1986	Stockholm Stock Exchange launches an inquiry into the options market but fail to produce a consensus
1987	The government inquiry into the options market is inconclusive and is merged into the inquiry on the whole financial market
1989	The government inquiry into the financial markets recommend removing the monopoly
1990	A decision to remove the monopoly is taken
1992	The new law removing the monopoly comes into effect
1997	OM acquire Stockholm Stock Exchange

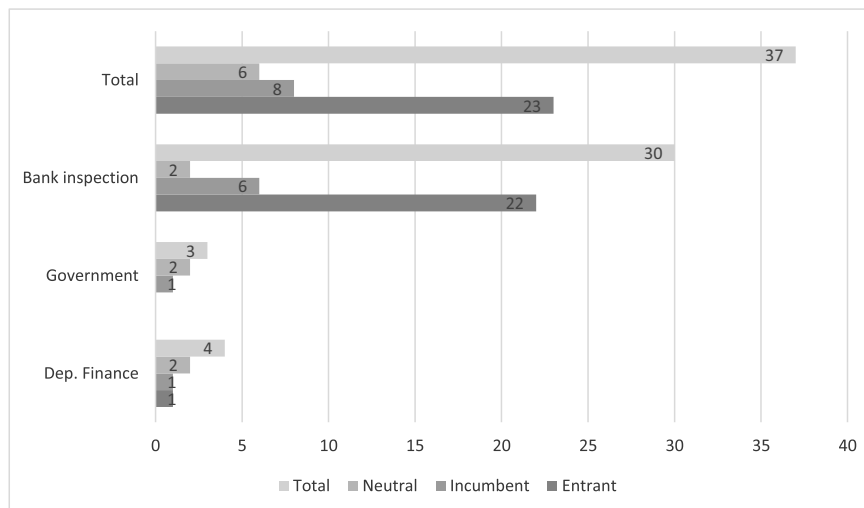


Fig. 1. All decisions made by various government bodies concerning the emergence of entrant firms in the financial exchanges sector who started operating next to the government monopoly of the Stockholm Stock Exchange.

4.1.2. Competitive dynamics

Earlier research into the dynamics between the entrant options market and the regulatory bodies show to what extent and how its corporate political activities fed into the regulatory process (Ernkqvist, 2015). Hence, while the explicit strategies of the entrant options market helped shape the regulatory process, perhaps more interestingly the incumbent stock exchange was surprisingly absent from this process.

On a direct question if SSE would lobby for a different outcome, the board member representing the traded companies at the time stated that: "No, and I think it was because the exchange did not see the demand [for trading with options] as particularly big" (Wolrath, author translation). When asked about the investigation the CTO of the exchange repeatedly stated that "it was a little sensitive, you can call it a little sensitive" (Hellberg, author translation).

Data used to show the extent and quality of the corporate political activities of the entrant OM between 1983 and 1993 (Ernkqvist, 2015) was supplemented by data on the actions and opinions of the Stockholm Stock Exchange. Out of 23 incidents where the exchange or actors representing the exchange discussed regulatory issues only at one point did the CEO discuss the potential removal of the monopoly in the SSE quarterly report where he was in favor of removing it. Two main reasons can be put forward for the general silence from the exchange about the emerging options markets. First, the exchange did write a report themselves preceding the official government investigation that ended up inconclusive with the actors in the investigation being split about the issue. Secondly, while the CEO was increasingly positive towards a free market during the studied period, the VP was against marketplaces being run making a profit.

While part of the explanation had to do with differences between the often market-oriented CEO and the VP, who rather had a background in law another part is structural. In the final stage of the investigation, the government investigation did recommend the removal of the monopoly, though it also recommended a strong means test that in effect would mean that only actors who passed strong requirements for "the public good of society" would be able to enter the market. This was noted by three of the members of the committee who wrote a reservation about it stating that this would mean that the monopoly would stay in place. Perhaps surprisingly, all the 15 consultation bodies including the Stockholm Stock Exchange followed this reservation and recommended for the new regulation to absent from a strong means test and go for a free market approach.

4.2. The telecommunications sector

Televerket was a Swedish state enterprise and regulator of the telecommunication market in Sweden. In 1980 it had a 70 years de facto monopoly of the Swedish telecom market behind them (Karlsson, 1998 p 75). The new pro-market ideas, shifts in opinion along with technological advances started to affect the telecommunications sector. Significant actors, including Televerket themselves, had initiated a far more pro-market rhetoric under the leadership of Tony Hagström who was the head of Televerket 1977–1993. For instance, before the launching of Teletex and Telefax he proposed a separation of Televerket's regulatory tasks and telephone service monopoly and that their Teletex and Telefax services should compete with other actors on the market.

There were small exceptions to this monopoly over the years. In the 1950s the private telecommunications company “Företagstelefon”, had been given permission to provide internal telecommunication services to private companies – but not to private persons. In the 1970s Företagstelefon, who now had changed its name to Comvik, tried to expand their business to private customers and to the new mobile telephone technology. However, Televerket consistently put obstacles in the way of Comvik's expansion plan – this despite Televerket's official position as favoring competition and pro market reforms. From 1980 to 1993 Televerket and Comvik was in recurrent conflict regarding the conditions for Comvik on the telecommunications market. The conflict evolved around three specific issues during the 1980s:

- 1) Televerket forbid Comvik to use automatic switches. Since Televerket themselves used automatic switches which were significantly more effective for connecting calls than manual ones Comvik opposed this restriction. Through substantial proactive non-market activities towards many different government agencies including the Näringsombudsmannen (NO) body, which was an independent legal authority for solving issues and conflicts on market conditions, Comvik did eventually get permission for automatic switches through a government decision in 1981.
- 2) In the middle of the 1980s Comvik wanted to expand their frequencies from 36 to 60. Televerket, who had 180 frequencies, delegated the decision to the government since they considered themselves biased in this issue. However, they still recommended the government to deny Comvik's demand for more frequencies since it, according to their claim, would lead to technical difficulties that put the quality of the whole telecommunication service in Sweden at risk. Again, Comvik started an extensive campaign on several frontiers including media, academia, government and NO. Televerket was, again, relatively passive in their the non-market activity. In 1987 Comvik was granted 14 more frequencies and hence ended up with 50 frequencies in total.
- 3) In the late 1980s Comvik wanted to buy AIX-switches from long time Televerket collaborator Ericsson. Surprisingly, Ericsson denied Comviks order. This made Comvik suspect that Televerket had pressed Ericsson not to sell the switches to Comvik. Something that Televerket denied. Again, proactive non-market activity was initiated through many different channels.

In sum, Comvik won all political battles against Televerket in the

1980s. Below, we describe the role of policy and some of the activities of Televerket and Comvik.

4.2.1. Regulation and oversight

As is clearly shown in Fig. 2, the department of communications, the government/politicians and NO were all more pro-entrant than pro-incumbent - hence more pro competition on equal terms - as mediators and decision-makers in the conflict between Comvik and Televerket. The NO body was a juridical instance that mediated conflicts regarding market conditions in Sweden. The Communications department implemented the political decisions from the government and also worked as an advisory and referral body before government decisions. The government is made up of the politicians that has the power over government and hence not just a part of the parliament. The virtue of competition and innovation is emphasized in many parts of society including public investigations and in debates on the future of the telecommunication sector.

Already in 1980 NO raised the question whether Televerket should decide on issues regarding connections to the public net since they also were a player in the market. In a referral to a public investigation for the telecommunication policy, preceding a government proposal, they wrote:

“Although it has not yet appeared that Televerket has abused their power as an approval body for connection of private equipment to the public net NO does think that the government should consider the conditions for another policy promoting competition on more equal terms”.

(NO referral 1980-01-11)

The same year the government made a proposition for clearer division of roles for Televerket as well as less barriers for connections of private equipment to the public net:

“The proposition/bill to some respect also mentions a new focus on the telecommunications policy as to which equipment may be connected to the telecommunications network. Private suppliers will thereby have increased opportunities to provide subscriber equipment in addition to telecommunications. Furthermore, the importance of clearly distinguishing the telecommunications agency's authority data from the business activities is emphasized. A new procedure for dealing with the testing and approval of subscriber equipment for connection to the telecommunications network should therefore be introduced.”

(Government Proposition 1980)

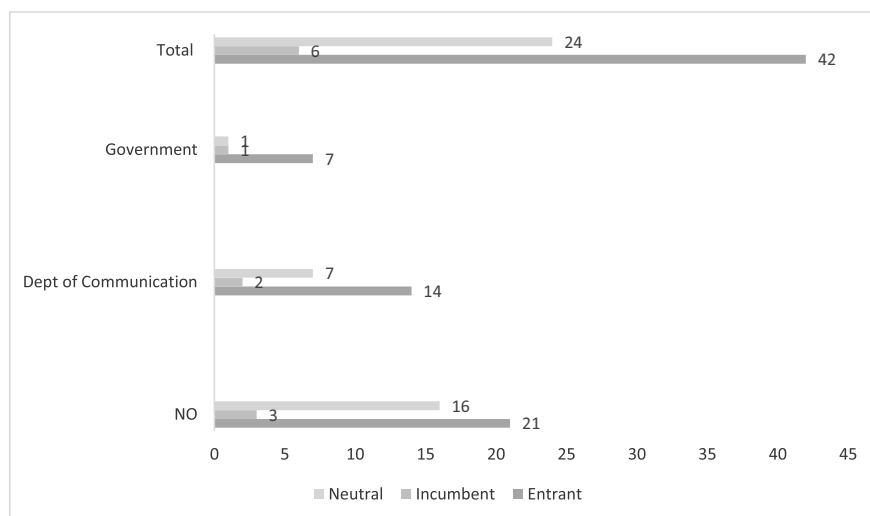


Fig. 2. the decisions made by various government bodies concerning the emergence of new competition in the telecommunications sector. As can be seen, all government bodies were during this time period overwhelmingly favoring more competition and the entry of new firms rather than the government monopoly Televerket.

However, it would linger to 1987 until there were significant changes in the policy of telecommunication in Sweden. This year the Communications agency suggested the abolishment of the PBX monopoly (monopoly of telephone switches) – basically meaning free competition for telecommunication services. In the referral answers most actors were positive to the abolishment of this monopoly and NO, who now had become a key player in the conflict between Comvik and Televerket, also suggested that the permission of connection of PBX to the public net should not be granted by Televerket, who as a player in this market was biased, but by a new independent agency called Statens Telenämnd:

“The PBX Monopoly should be abolished. Such categories of management decisions, which concern areas where the Televerket operates commercially in competition with others, should be taken by the Statens telenämnd at first instance.”

In a proposition in early 1988 the government followed the recommendations of the Communications agency and NO:

“Further, it is suggested that a new authority, Statens telenämnd, is established and takes over the duties of Televerket to issue regulations on the connection of equipment to the public telecommunications network. The exclusive rights of the telecommunications network to connect PBX and coin machines to the public telecommunications network are proposed to expire no later than 1 January 1990 and 1 January 1989 respectively.”

(Government proposition/Bill 1987/88: 118 on telecommunications policy)

The parliament did approve this part of the government bill/proposition and Televerket was stripped of both their PBX monopoly and their role as permission decider for connection of private equipment to the public net. Finally, in 1993 the government suggested the transition of Televerket to a corporation (and the changing of the name to Telia) which would hand over all regulatory tasks to Statens Telenämnd and Telstyrelsen.

4.2.2. Competitive dynamics

During Televerket's conflicts with Comvik several aspects are striking, namely the will of Televerket to compete in the Teletex and Telefax businesses, a tendency to engage in a pro-competition rhetoric, and the unwillingness to compete on equal terms with Comvik on the mobile telephone service. While Televerket tried to obstruct and stop Comvik from entering the market, the organization often made public

statements saying that they were in favor of more competition.

When looking at Televerket's activities vis-à-vis regulatory bodies, it is clear that the organization was not able to engage in regulatory capture. Comvik was granted what they asked for and Televerket was first and foremost a defensive actor. The number of proactive measures taken by the organization to influence the regulatory set-up were very limited.

As is clearly shown in Fig. 2, NO, the department of communication and the government/politicians were more pro Comvik than pro Televerket. Comvik's non-market activities stand in contrast to Televerket's in numerous ways. Comvik is almost entirely proactive in its non-market activities.

5. Analysis and discussion

Our results show that in both the Swedish financial sector and in the telecommunications industry, policies were enacted in order to encourage competition and the emergence of de novo entrant firms. Figs. 1 and 2 illustrate that during about one decade, policies enacted by both elected politicians and supervisory and regulatory bodies such as the Royal Bank Inspection and the NO made decisions that favored both the emergence of new entrants and the transformation of incumbent monopolists into actors competing on an open market.

Revisiting the typology of innovation policies as depicted by Potts et al. (2016), it is clear that the role of policy in these two successful TTs was largely one of removing barriers to innovation and entrepreneurship rather than one of providing supporting structures. Our digital archive does not indicate the presence of any significant supporting initiatives that have had any considerable impact. To the contrary, the role of government seems to have been to through their own decisions and via various supervisory bodies such as the Bank Inspection and the NO encourage industrial and technological renewal on a broader scale.

It is clear that on numerous occasions, vested interest groups such as Televerket in the telecommunications sector, banks and the SSE in the financial sector, were not able to captivate the regulatory process and influence it to their favor. Brokers who lost their jobs due to the emergence of digital stock trading were not able to hinder progress. The SSE remained passive and mostly neutral concerning the emergence of new actors. Televerket tried several times to influence regulation to their favor but lost to an entrant firm in the form of Comvik. Most of the time, Televerket had to remain defensive and was not able to exert any considerable political influence. If anything, our data rather suggests that entrant firms such as OM and Comvik were, despite their limited

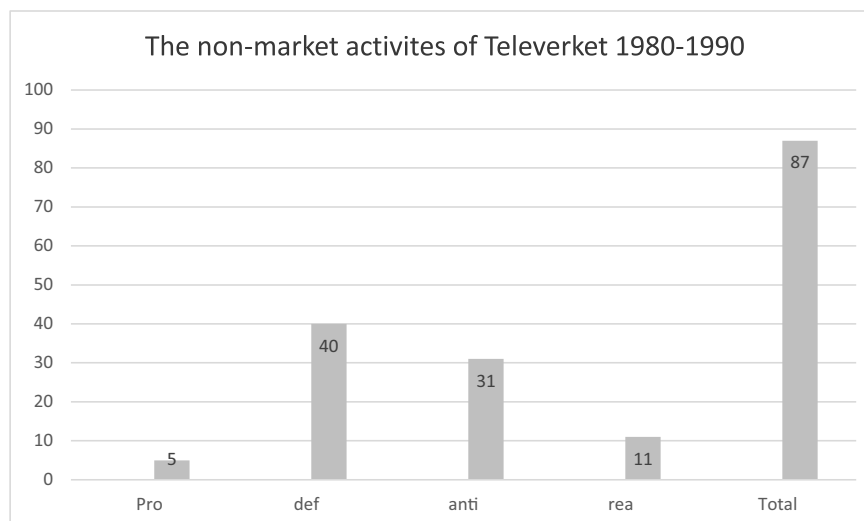


Fig. 3. Share of Televerket's non-market activities that were proactive, defensive, anticipatory and reactive during the time period 1980–1990. For more information on the coding scheme, see Oliver and Holzinger (2008).

size, able to proactively influence and shape regulations to their favor.

5.1. The avoidance of regulatory capture

Why did regulatory capture by vested interest groups as depicted in conventional economics (Carleheden, 1999) not occur in the two cases described above?

Incumbent interests usually have advantages in the form of superior financial and relational resources (Mokyr, 1994). Moreover, as argued by Potts et al. (2016), policies favoring the removal of resistance to innovation and entrepreneurship are often difficult to enact. While such policies may create a lot of economic value, this value is distributed throughout society across voters who may obtain more valuable offers on the market and across de novo entrants who may stand to reap benefits from e.g. the opening of a markets. As these actors are usually dispersed and immobilized, the benefits for politicians in adhering to these actors is usually low.

Conversely, policies aimed at removing obstacles tend to generate a damage that is concentrated to small and potentially influential interest groups. In sum, politicians are unlikely to support policies aimed at removing resistance to innovation and entrepreneurship as the benefits of these policies are usually both unrealized and distributed while the costs are concentrated to specific actors in society who are strongly incentivized to block any attempts to distort their power. Drawing upon the framework by Geels (2004), our findings point at several enabling conditions, which include experimentation in niches, support within the established socio-technical regime (ST) and a macro landscape that made it increasingly possible to enact pro-competition policies. These levels are reviewed in the following sub-section.

5.2. The presence of niche experiments

Both the telecommunications industry and the financial sectors contained various niche experiments enabled by digital technology. In the telecommunications sector, the entrant firm Comvik offered an alternative mobile phone service adjacent to the government monopoly Televerket. In the financial sector, OM emerged next to the SSE with a platform for options trading that grew rapidly. At the same time, the CEO of the SSE had a vision of a fully electronic stock exchange which required a considerable departure from the status quo.

5.3. The socio-technical regime

According to Geels (2004), the presence of niche experiments is an important and necessary precondition for TTs to occur, but resistance within the established ST usually implies that this does not happen, especially bearing in mind that benefits are dispersed and damage is concentrated to vested interest groups who often posit abilities to obstruct and little incentives to change (Battilana, 2006).

A couple of factors prevented such blockages from taking place in our cases. To start with, there seems to have been enough anticipated gains from the niche actors to gather support from private interests within the ST regime. Comvik was piling up losses during the entire 1980s, but was nevertheless backed by Jan Stenbeck, a powerful industrialist who owned and controlled several established industries in Sweden. When the telecommunications sector was opened for competition in the 1990s, Stenbeck's firms Comvik and Tele2 quickly gained considerable market share and became profitable operators. Financial and rhetorical support from a powerful conglomerate like Stenbeck's Kinnevik was probably a factor contributing to Comvik's success in the political domain in the 1980s. This support can in turn probably be explained by the considerable private gains that could be obtained by Stenbeck in a subsequent stage.

Similar mechanisms were present in the financial sector. While OM was founded by a private entrepreneur, the firm was from its onset supported by a prominent capitalist family in Sweden, the powerful

Wallenberg family. Wallenberg owned a considerable portion of shares in OM, which meant that its retail bank SEB along with a collection of other actors supported OM. Thus, OM gained legitimacy in the early stages and was in many ways sheltered by being connected with the Wallenberg family.

Likewise, the SSE harnessed considerable political support when its CEO initiated formulation of a long term strategic vision and mission of becoming "the best national stock exchange in the world". In the process of bridging diverging interest under this long-term strategy, the CEO could draw on his previous experience as president in SNS where he had been involved in several reform projects involving efforts to reach consensus among Swedish politicians, business leaders and representatives from interest groups. When facing resistance from brokers who saw a risk of losing their jobs due to digitalization, he could rely upon a board that was largely supporting him.

When looking at resistance within the ST, it is also clear that these actors were not able to exert considerable influence. Televerket had to remain defensive vis-à-vis Comvik and the regulatory bodies. In the financial sector, the SSE left OM untouched in its niche and did not pay any attention to OM, perhaps because it was not in direct competition with the SSE.

5.4. The Landscape level

Our empirical description also shows that change agents could harness support from macro trends on the landscape level. Technological advancements rendered previously taken for granted monopolist positions of Televerket and the SSE obsolete. Trends towards deregulation and more competition had already come into motion abroad. Both Comvik and OM were influenced by these trends in their respective industries as they made use of new technology to realize new business opportunities in Sweden. Shifts in public opinion towards more deregulation and increased competition also put politicians in a position where they could enact such policies instead of being subjected to regulatory capture (Karlson, 2017).

5.5. The role of policy in promoting TTs

In sum, we observe that the role of policy in facilitating industrial renewal and TTs to take place was largely about removing obstacles and creating conditions where de novo entrants could grow and transform the sector. According to conventional economics, the political cost of enacting such policies is often high. In the two cases described above, we argue that policymakers were able to avoid regulatory capture due to the combination of factors described to be present in Geels' (2004) multi-level framework. The presence of niche experiments, limited resistance in the ST, powerful supporters in the ST and trends on the Landscape level made it possible for policymakers to undertake the initiatives necessary for accomplishing successful TTs. Our findings are therefore largely in line with Geels' framework. The primary contribution rather lies in highlighting the role played by policy in generating large-scale sector transformation.

While we acknowledge that innovation policies did contribute to the removal of barriers and not end up in a situation of regulatory capture, we regard these cases as exceptional. In general, innovation policy in the Western world is likely to become overly focused on support and often, too little effort will be devoted to dealing with vested interest groups (Potts et al., 2016). Moreover, recent evaluations of R&D subsidies and various innovation support schemes show negligible effects on firm turnover and job growth over time (Gustafsson et al., 2016a, 2016b), negative effects in sparsely populated areas (Tingvall and Videnord, 2018) and result in the emergence of subsidy entrepreneurs, i.e. firms that systematically exploit public support schemes (Gustafsson, 2017; Gustafsson, 2018).

Innovation policy in the Western world has to a large extent been concerned with creating support structures for R&D, including

mechanisms for technology transfer, publicly sponsored research and education, along with various support schemes aimed at small firms. When such policies are implemented without properly dealing with vested interests, they are unlikely to result in industrial renewal. We therefore argue that innovation policy for renewal of Western economies is largely a matter of removing barriers and dealing with interest groups in a strategically sound manner rather than the creation of various support structures that seem to have limited effects on renewal.

We acknowledge several limitations of our study. First, both financial exchanges and the telecommunications sector are very complex industries with many and intertwined actors. While our data and related methods enable us to provide a rich empirical description of two sectors over a full decade, we observe that there is vast research on various aspects of these industries within economics, management, sociology and business history and policy (Andersson, 2000; Gorham and Singh, 2009; Markham and Harty, 2011; Carleheden (1999); Karlsson (1998); Lernevall and Åkesson (1997); Englund, 1999; Carleheden, 1999; Ernkvist, 2015). We regard the empirical descriptions in this paper as complementary and the primary contribution lies in our quantifications of various policies and activities by different actors.

Second, as our research only concerns two sectors in one country, we welcome further empirical research on this issue, especially in sectors where the interplay between regulations, vested interests and technology are important. The taxi industry's response to Uber's entry would be of interest to study in further detail (Laurell and Sandström, 2016; Laurell and Sandström, 2017). In many countries, gambling has also been subjected to techno-regulatory turbulence over the past decade due to the emergence of online casinos and online betting. Generally, we welcome further research on how policymakers can deal with vested interest groups and accomplish renewal (Karlson, 2017).

6. Concluding remarks and future research

In this paper, we have explored how industrial renewal takes place in mature Western economies. In particular, we have addressed the role of policy in successfully accomplishing a Technological Transition.

Drawing upon a dataset spanning two industries over an entire decade, we show that policy was consistently geared towards favoring competition and de novo entrants. Hence, regulatory capture in its conventional sense, did not occur. To the contrary, policymakers were consistently acting in order to favor the emergence of de novo entrepreneurial firms who paved the way for technological and institutional changes. Our primary contribution therefore lies in pointing out that successful innovation policy can be about dealing with resistance rather than supporting experiments (Juma, 2016; Potts et al., 2016) and in explaining under what circumstances regulatory capture can be avoided.

Drawing upon Geels' (2004) multi-level framework for studying TTs we explain this pattern by highlighting that several enabling conditions were present in both the telecommunications sector and the financial sector. Niche experiments were taking place and could gain a foothold in the ST regime due to limited resistance, strong support from both powerful interest groups and policymakers. Several macro trends on the landscape level did further enable TTs to take place. Our findings suggest that successful innovation policy in mature economies is largely a matter of overcoming resistance from interest groups rather than creating support structures.

We welcome further research on the role of policy in accomplishing industrial renewal in Western economies. Specifically, issues related to regulatory capture and how vested interest groups can be managed are of considerable importance for future research. With regards to methods, we note that the use of digital archives has made it possible to cover and analyze vast amounts of data across longer periods of time. Previously laborious historical methods are enabled by the considerable productivity improvements obtained from being able to search for

relevant documents. Also, digital archives open up new opportunities for collaboration and comparisons across historical cases. We would argue that digitalization in a broader sense opens up for the increased prevalence of historical methods in management and economics (Gustafsson et al., 2016a, 2016b) and acknowledge that this issue merits further investigation.

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Appendix 1. Digital archives

The study is based on a larger research effort to collect archival data on the telecommunication- and financial exchange sector in Sweden, covering both regulatory bodies, official investigations into the sectors, incumbent and entrants as well as key interest association (Geissinger et al., 2018; Ernkvist, 2015). The majority of archives are organizational archives, but the list also includes a few personal archives from key actors in the development.

Archive research methods in general is a process in which the collection of data is depending on a range of conditions and practical challenges for researcher. The (i) existence of preserved archive for organizations and their preservation policy is a fundamental condition for research. In addition to these, there are practical challenges for archive research related to: (ii) the identification of archive, (iii) securing access conditions to archives, (iv) evaluation of the archives preservation process and potential biases, (v) the researchers selection of documents and (vi) the methods to systematically analyze collected archival records – in our case based on digitalization, OCR and a relational database with structured added metadata.

The core set of archives was identified in the beginning of the larger research project, while a few also were added later as the role and involvement of different organizations in the policy process became more evident.

This identification was supported by an effort to gain a rich contextual understandings of the sector aided by: close reading of secondary literature on both sectors, analysis of the final government official investigations which describes the role of various actors in both sectors, the construction of events & timelines of the policy process, interviews with actors, keyword search in the database on organizations, news coverage of both sectors and the reading of the Swedish parliaments discussion of both sectors in various documentary series (e.g. political debates, proposals and government questions) of the sector. The complete digitalization of these parliament records (1971 onward) as part of "The Riksdag's open data" (<https://data.riksdagen.se>) made possible keyword search.

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